EARLY READMISSION IN THE ELDERLY WITH CONGESTIVE HEART FAILURE

By

JUDY BURFORD

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By

Judy Burford

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Nearly 5 million Americans have congestive heart failure (CHF), and approximately 400,000 new cases are diagnosed annually. The incidence of CHF continues to increase as the population of the United States ages and the treatment of heart disease improves. Congestive heart failure is the leading cause of hospitalization among older adults and is frequently associated with early readmission. Little is known about the factors that influence readmission in CHF. The purpose of this study was to determine factors predictive of readmission, within 60 days, in elderly patients with CHF. A cross-sectional, retrospective design using secondary data and medical records was used to examine a data set of primarily elderly veterans with the diagnosis of CHF.

The results of the study indicated that readmission in patients with CHF was significantly correlated with history of smoking. The factors predictive of readmission were history of smoking, diastolic blood pressure, and marital status. Logistic regression was used to differentiate between those patients who were readmitted once or more, within 60 days, and those who were not readmitted. The results indicated that only two variables, history of smoking and diastolic blood pressure, were significantly different between the two groups.

CHAPTER 1
INTRODUCTION

Background of the Problem

Congestive heart failure (CHF) is a condition defined as the inability of the heart to maintain adequate cardiac output to meet the minimal requirements of tissues and remove byproducts of metabolism from tissues despite a normal circulating volume and hemoglobin concentration (American Heart Association [AHA], 1996). The individual with CHF has presented a challenge to the health care system for decades and will continue to do so into the 21st century as the population in the United States ages. Over the past two decades, CHF has become an increasingly frequent diagnosis on hospital admission summaries and today affects nearly 5 million Americans with 400,000 new cases diagnosed annually (Ho, Pinsky, Kannel, & Levy, 1993). Clearly, CHF represents a major health problem.

Although heart disease (HD) is on the decline, CHF is on the increase. Early recognition of individuals with heart disease and better treatment contributed to longer survival, but increased the likelihood of developing CHF (Jaarsma, Halfens, & Saad, 1996). Almost 2 million hospitalizations occur yearly for individuals with this condition (English & Mastrean, 1995). The U.S. Department of Health and Human Services estimated the total cost of treatment for CHF in 1990 to be over $10 billion when the cost of provider visits, medications, and nursing home stays were included (AHA, 1996). The cost of treatment for this condition is overwhelming and places a significant strain on our health care dollars.

Annual mortality rates for CHF are also increasing and the prognosis for survival is poor. Mortality rates range from 15% to 60%. Individuals with early, less advanced disease have a 50% 5-year survival rate as compared to a 50% 1-year survival rate in individuals with advanced disease (English & Mastrean, 1995; Hanson, 1994; Poole-Wilson, 1993). Although recent pharmacological research yielded newer treatments, the majority of CHF patients are on a chronic illness trajectory with no hope of cure (Hawthorne & Hixon, 1994). The illness trajectory can be a rapid, downward progression with recurrent episodes of CHF frequently requiring hospital readmission to achieve stabilization of the disease.

Readmission is defined by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) (1994) as an admission to a hospital or health care organization within a specified period after a prior admission or because of complications relating to a prior admission (1994). Many hospitalizations for the elderly are actually readmissions for the same or related problems (Gooding & Jette, 1985; Rich et al., 1995; Zook, Savickis, & Moore, 1980). Congestive heart failure is the most frequent indication for hospitalization in the elderly and is frequently associated with early readmission (Gooding & Jette, 1985; Rich et al., 1993; Vinson et al., 1990). Rich and fellow researchers (1993) found that 47% of patients 70 years or older, hospitalized with CHF, were readmitted once or more within a 90 day period. The elderly patient with CHF is at risk for early and repeated readmission because of the severity of the illness, age, and the impact of psychological and social stress on the disease course and recovery. Hospital readmission increases the risk of the patient becoming confused and less likely to manage the post hospital recovery process.

Although the admission/readmission can be an expensive financial process, it can be expensive emotionally as well. This emotional difficulty comes at a time in the elderly adult's life cycle when he or she is less able to deal with social, emotional or physical loss. For the patient with CHF, hospital admission/readmission may exacerbate his/her worst fears: loss of independent physical functioning, increased dependency on family and friends and loss of self-esteem (Berkman, Dumas, Gastfriend, Poplawski, & Southworthe, 1987). Berkman and colleagues found multiple readmissions intensified the interplay between medical and psycosocial factors affecting the patient, family and caregivers. The impact of CHF carries considerable financial, emotional and economic burdens particularly to the elderly. Frequent hospitalizations and long-term pharmacological therapy are associated with this syndrome (Anderson & Steinberg, 1984).

Also, individuals with CHF who experience readmission are more vulnerable to feelings of uncertainty. Illnesses with a predictable course and resolution leave the patient with a sense of control. Chronic conditions such as CHF often leave the patient with a sense of vulnerability and doubt regarding health care, providers, nurses and treatment regimens. Relapse of CHF and subsequent readmission leave the patient with a sense of loss of control and the thought of subsequent reoccurrence looms over his/her head. Stewart, Hirth, Klassen, Makrides, and Woolf (1997) investigated patients with ischemic heart disease (IHD) and compared those admitted for the first time to those who were readmitted. They found that those who had experienced previous admission for the same disease appraised their readmission as more threatening. Stewart et al. suggested uncertainty was related to perceived loss of control and dominates how the patient perceives the features of an event when the outcome is unclear. Webster and Christman (1988) investigated uncertainty and coping in patients with IHD. Their findings suggest uncertainty about illness was associated with greater emotional distress.

Despite the financial and emotional costs of readmission for all diagnostic groups, little is known about the factors that influence readmission and how readmission can be prevented. The following risk factors were researched: dependency, age, stage of illness, hospital length of stay, prior hospitalization, after discharge care, and compliance with medication and diet regimens (Jaarsma et al., 1996). Although readmission is a relative new topic of research, the body of literature on this topic is growing. Anderson and Steinberg (1984) and Soeken, Prescott, Herron, and Creasia (1991) reported investigating factors that could reduce readmission rates, but little has been done to examine readmission in the patient with CHF. Given the cost of readmission on health care costs, a slight reduction in the overall readmission rate could contribute to a large financial savings. Also, there is a need for information on risk factors and interventions. This information would be useful in the development of predictive models to assist providers and other health professionals to identify those patients with CHF who are at greater risk for readmission.

Although there is a large body of scientific evidence describing factors that contribute to the development of HD, minimal investigation was conducted to determine factors leading to the worsening of CHF and subsequent readmission. Researchers have established that age is a principal determinant in the incidence of CHF (Gooding & Jette, 1985; Rich & Freedland, 1988; Vinson, Rich, Sperry, Shah, & McNamara, 1990; Wolinsky, Smith, Stump, Overhage, Lubitz, 1997). The advancing age of the population in part is believed to account for the increase in the diagnoses of CHF. The trend for more frequent readmissions in patients with lower ejection fractions is a factor recommended for additional risk factor assessment for early readmission (Vinson et al., 1990). Factors of smoking, hypertension (HTN), and obesity have been widely investigated with relation to HD. Yet, despite aggressive efforts to control HD and the subsequent reduction in HD, CHF continues to rise. Clearly, there is a great need to investigate factors leading to worsening of CHF and subsequent readmission in individuals who were previously stable. Relapse may be triggered by worsening cardiac status but do the factors of smoking, HTN, and obesity contribute to relapse and subsequent readmission?

Conceptual Framework

The theoretical framework for this study is the cognitive-phenomenological concept of uncertainty in illness by Mishel (1981). In Mishel's theoretical framework, uncertainty is viewed as a natural phenomenon. This differs significantly with the mechanistic world view of control and stability. Within the process of illness, lies a concern for the severity, treatment and outcome of the disease process and the impact on the individual. Will the individual be able to pursue goals and fulfill ambitions and expectations? Today's lifestyle is organized around achievement, predictability and control. Uncertainty reduces this sense of mastery and control. Uncertainty of illness is defined by Mishel as "the inability to determine the meaning of illness-related events and occurs in situations where the decision-maker is unable to assign definite values to objects and events or is unable to accurately predict the outcome because sufficient cues are lacking" (Mishel, 1990, p. 256).

Uncertainty theory explains how patients process illness and structure meaning for the illness (Mishel, 1990). Mishel used the works of several theorists to advance the theory of uncertainty, including the illness-treatment situation of Moos and Tsu (1977). Moos and Tsu categorized the illness-treatment phenomenon into four classes of events, including the initial discomforts of illness; special treatment procedures and resulting side effects; the technical environment, the hospital facility, staff and unfamiliar routines; and the future and potential for independence.

Supporting the work of Norton (1975), Mishel theorizes every uncertain event will contain one or more of the following: (a) vagueness, (b) lack of clarity, (c) ambiguity, (d) unpredictability, (e) inconsistency, (f) probability, (g) multiple meanings, and (h) lack of information. Mishel postulated recognition and classification are fundamental to attributing meaning to an event. When uncertainty is present, recognition and classification are not established; consequently a cognitive structure fails to be established. A cognitive structure is defined as the patient's subjective evaluation of the illness, treatment, and hospitalization events. For the patient to recognize and classify an event or illness, the event must meet the contextual expectation which corresponds to the individual's expectation. Once recognition is in place, the patient is able to classify and supply meaning to the event. Mishel describes this process as configuration or pattern recognition and congruence between the event and category are established. Uncertainty impedes the process of cognitive structure and limits appraisal and decision making (Mishel, 1981).

Mishel also used chaos theory to further advance the concept of uncertainty. Chaos theory embraces the belief that disorder, instability, and disequilibrium are a normal variability of a system as compared to the traditional focus of science which strives for stability, order, and equilibrium (Pool, 1989).

Repeated readmission for the same illness such as CHF results in a state of uncertainty. For the patient living with CHF to cope with uncertainty, especially of the episodic worsening of the condition and often readmission, uncertainty must become an accepted part of the illness. Prior life experiences, physiological status, social resources and health care providers can assist with the state of uncertainty. It is essential that the patient reorder the perspective to include readmission and accept uncertainty as a phenomenon of the disease. The health care provider plays an essential role in this process.

Early in the illness, uncertainty creates a state of flux and disequilibrium but as the patient lives with and through the disease, he/she creates a new sense of order; disruption and uncertainty become a part of the "order." Mishel (1990) suggests this "new world view" develops from chaos. Probabilistic thinking is a part of chaos and replaces absolutes such as control. Mishel suggests probabilistic thinking is beneficial to the patient because this aspect allows establishing contingencies and seeking new trials and treatments (See Figure 1).

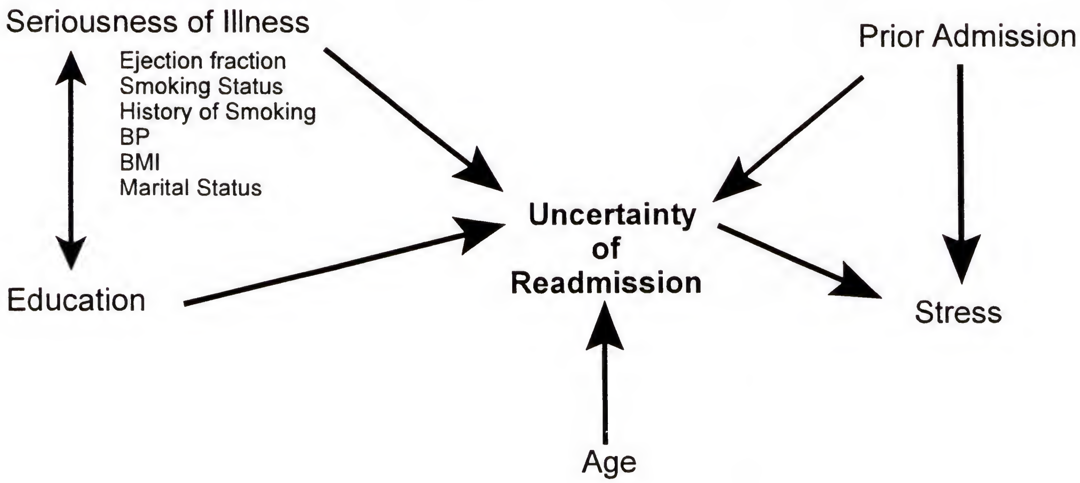

Figure 1. Conceptual Model of Uncertainty of Readmission (Source Mishel, 1984)

Purpose of the Study

The purpose of the study is to determine specific factors predictive of readmission, within sixty days, in elderly patients with CHF. Identification of factors that may place the individual with CHF at risk for early unplanned readmission can be useful in several ways. First, this information will be beneficial to the provider to improve discharge planning and follow-up care. Second, this information can be used by agencies for outpatient support of families who provide after-discharge care. Third, this information may be used to target those individuals at greater risk and potentially to reduce their readmission to the hospital--both reducing cost to the facility and the health care system and to reduce cost to the patient, both financially and emotionally.

Significance of the Study

Patients with CHF are at risk for frequent readmission following discharge and little is known about the factors that influence readmission. Smoking and hypertension are two identified risk factors placing individuals at risk for HD. The impact of smoking, obesity and hypertension on CHF and subsequent readmission is not known. Information that may assist with identification of patients who are at greater risk for readmission could be used to design better methods of discharge planning and ultimately reduce the readmission in those at greater risk for readmission. Reduction of this type could save significant healthcare dollars. This information also could be useful to the provider and healthcare facility in the creation of strategies for reducing readmission rates.

Research Hypotheses

The research hypotheses of this study are as follows:

1. Readmission in patients diagnosed with CHF is significantly correlated with history of smoking and current smoking status.
2. Readmission in patients diagnosed with CHF is significantly correlated with ejection fraction.
3. Readmission in patients diagnosed with CHF is significantly affected by sociodemographic variables including age, height and weight (BMI), blood pressure, marital status, employment status, and smoking history and smoking status.

Definition of Terms

Ejection Fraction (EF) is the percentage of blood ejected from the left ventricle during systole.

Readmission is an unscheduled admission for an acute problem associated with the patient's principle chronic disease of CHF within 60 days of discharge from an acute healthcare facility.

History of Smoking is defined in this study as the number of packs of cigarettes smoked per day multiplied by the number of years of smoking.

Current Smoking Status is defined in this study as whether the patient is currently smoking.

Scope and Limitations

This study is limited to the patients admitted at a large hospital in the Department of Veterans Affairs in the southeastern United States. Data are retrospective and collected from hospital medical records of those patients included in the secondary data set.

CHAPTER 2
REVIEW OF THE LITERATURE

This review of literature is organized in the following areas: (1) congestive heart failure, (2) congestive heart failure and aging, (3) obesity and heart disease, (4) smoking and heart disease, (5) hypertension, (6) ejection fraction, and (7) congestive heart failure and readmission.

Congestive Heart Failure

Congestive heart failure is a condition or syndrome in which the heart is unable to meet the metabolic demands of the body, and subsequent adjustments of the heart, kidney, lung, peripheral vascular system, and neurohormonal responses are exerted. These adjustments cause signs and symptoms recognized by today's provider as the syndrome of CHF (Barker, Burton, & Zeive, 1995; English & Mastrean, 1995). This syndrome results from left ventricular dysfunction as a consequence of a variety of diseases, including ischemia coronary artery disease (CAD), HTN, congenital heart disease, valvular disease, and idiopathic dilated heart disease (Poole-Wilson, 1993). Congestive heart failure is characterized as a high cardiac filling, low output state due to ventricular impairment and frequently presents with the individual complaining of fatigue and shortness of breath.

The impairment of CHF is caused by one of the following mechanisms: an increased work load which the heart cannot accommodate; a disorder of the myocardium that prevents the myocardium from meeting normal work load demand; or a restriction that prevents normal ventricular filling. Examples of impairment may be the scarring that results from the myocardial infarction or remodeling of the myocardium; generalized hypertrophy or dilation as a result of chronic volume overload of hypertension or valvular disease; or global hypokinesis from massive infarction or viral etiology (English & Mastrean, 1995).

The syndrome of CHF today is fundamentally different from the CHF of decades ago. Early CHF studies, such as Framingham, found hypertension and/or valvular disease to be the most frequent causes of CHF (Ho, Pinsky, Kannel & Levy, 1993). However, the underlying causes and management of CHF appear to have changed over the past two decades. Medicine has concentrated on early recognition and treatment of HTN and reduction of valvular heart disease. These efforts resulted in reduction of these as the primary etiology of CHF. Today, CHF is more commonly the result of ischemic heart disease (IHD) (AHA, 1996). The clinical presentation of CHF may vary from sudden onset of dyspnea to cardiogenic shock. With few exceptions, treatment of CHF requires hospital admission.

Congestive heart failure has long been recognized by the medical community, but only in the past two decades has CHF been recognized as a major public health concern (Rich, 1997). The attention to CHF is likely due to the increasing prevalence and subsequent impact on today's health care dollars. Over the past decade the incidence of CHF has almost tripled with nearly 5 million people developing CHF and approximately 400,000 new cases diagnosed annually (AHA, 1998). Heart failure is the fastest growing disorder in the U.S.

Epidemiological researchers estimate the number of adults with CHF doubles with each decade of life--3 cases per 1000 in men ages 50 to 59 as compared to 27 cases per 1000 in men ages 80 to 89 (Rich, 1997). Therefore, as the population of the U.S. ages, the incidence of heart failure and mortality is expected to continue to grow. Not only is the incidence rising, so too is the expenditure for treatment, which currently is estimated to be 10 billion dollars annually in the United States alone (Rich, 1997; Stafford, Saglam, & Blumenthal, 1997).

Over the past twenty years, there has been a noted decline in the mortality rate of HD, yet the incidence and prevalence of CHF has continued to increase and is expected to do so in the coming century (Morbidity and Mortality Weekly Report (MMWR), 1994; Rich, 1997). How can this be explained? The most prevalent explanations offered include the following: reduction of mortality associated with the acute myocardial infarction; improved management of HTN; and progressive aging of the population (Rich, 1997).

In summary, improved management of HTN and IHD allow individuals to live longer with these conditions and carry these conditions into later life, thus developing CHF at later age. Years ago, individuals who suffered an acute myocardial infarction frequently died. Today, these individuals are more likely to survive the insult, but the damaged heart contributes to the development of CHF later in life.

CHF and Aging

Although CHF is a somewhat uncommon occurrence in adults under the age of 45, it is a common problem in the older adult, and the prevalence increases with age. Congestive heart failure rises almost exponentially with age, starting in the fifth decade and doubling every 10 years. It is six times more common in individuals 65 and older as compared to those 45 to 54 years of age (AHA, 1998). Congestive heart failure is commonly seen after the age of 65. Current data reveal more than 75% of the patients admitted for treatment of CHF in the U.S. are 65 years or older (AHA, 1998). In the medicare population, CHF is the most common diagnosis for hospital admission and the leading cause of death. Congestive heart failure is the leading cause for admission of the elderly to an acute care facility (Rich, 1997; Wolinsky, Smith, Stump, Overhage and Lubitz, 1997).

In CHF, the heart is unable to meet needed cardiac output to supply tissue needs despite an adequate amount of left ventricular filling pressure. The causes of CHF in the older adult are essentially the same as in the general adult population (Bourassa et al., 1993; Hixon, 1994). Cardiac output is influenced by four major factors: rate, contractile state, preload, and afterload. One or more of these may be affected by aging (Rich, 1997).

Many researchers have noted that the older adult is at increased risk of developing CHF as a result of age-related changes in addition to the conditions of ischemic heart disease, HTN, and valvular diseases (Croft et al., 1999). Age-related changes have been documented in cardiovascular research. Cardiac output decreases with age, both resting and with exercise. Maximal heart rate, maximal cardiac output, ventricular filling, and maximal oxygen consumption decline with aging. By age 70, ventricular filling is reduced by 50% as compared to the individual at age 30 (Aronow, 1999a). Researchers found the heart is less able to respond to either physical or emotional stress. There is less ability to increase cardiac output by increasing heart rate and contractility as well as less peripheral dilation. Secondly, there is increased vascular stiffness that results in increased impedance to left ventricular ejection, thus contributing to increased systolic hypertension. Also, with age the heart itself becomes stiff and less compliant. As the heart becomes more stiff, there is less diastolic filling, and the filling of the left ventricle is diminished (Aronow, 1999a).

In summary, older individuals have less cardiac reserve and less ability for the heart to compensate in situations of increased cardiac demands. Age-related changes result in altered cardiac function, which leads to reduced cardiac reserve, increasing the risk of CHF in the aging adult. Yet in elderly individuals who do not possess conditions such as HTN, valvular disease, or IHD, cardiac function is preserved, and cardiac output is maintained even with the noted changes of aging. When these changes occur in an adult with underlying HTN, IHD, or valvular disease, the damage results in CHF (Aronow, 1999a).

Prognosis of CHF depends on a number of factors, such as coexisting diseases. Of the elderly with heart failure, 75% have a coexisting condition of HTN or other forms of HD (AHA, 1996). Elderly individuals with CHF who also have sustained an acute myocardial infarction due to IHD are at high risk for sudden death or progressive worsening of the CHF (AHA, 1996).

A number of risk factors have been associated with CHF. Risk factors included in this literature review are obesity, cigarette smoking, and HTN.

Obesity and Heart Disease

Obesity affects not only the U.S. population but also developing countries of the world. The Third National Health and Nutrition Examination Survey (NHANES III) (1988-91) (Burt et al., 1995) reported that 33% of the U.S. population is obese compared to 25% noted in the previous survey of 1980 (Kuczmarski, Flegal, Campbell, & Johnson, 1994). Obesity is associated with a number of other comorbidities, including forms of heart disease.

Until recent years, the relationship between obesity and heart disease was viewed as one of indirect rather than direct. The indirect was seen as having a covariate relationship and relating to HTN and dyslipidemia, especially in individuals with low HDL, and/or with impaired glucose tolerance such as noninsulin dependent diabetes mellitus (NIDDM). However, recent investigators (Kuczmarski et al., 1994) suggest a direct relationship between obesity and heart disease and further suggest obesity as a predictor of CAD. Other investigators find that LVH is common in individuals with obesity and that HTN is almost three times more common in individuals with obesity as compared to normal weight men and women (Messerli, 1982).

For many years, the definition of obesity was based on the mortality data provided by the Metropolitan Life Insurance Company (1983). This data did not consider an individual's body frame size and, as a result, created significant controversy. Today, body mass index is used and uses weight in kilograms divided by the individual's height in meters squared (kg/squared). Recently, researchers also noted increased waist circumference or waste-to-hip ratio as a predictor of mortality from obesity (Eckel, 1997).

Smoking and Heart Disease

Several studies evaluated the hemodynamic effects of smoking. Several studies documented that cigarette smoking increased heart rate, blood pressure, and oxygen demand but decrease myocardial oxygen supply (Blick, Harris, Heibig, Moake, & Majid 1989; Rabinowitz, Thorp & Huber, 1979). Blick et al.(1989) studied subjects with ischemic chest pain and normal coronary arteries. They reported cigarette smoking, in subjects with normal coronary arteries, increased heart rate, blood pressure, and myocardial oxygen demand. Goldbarg, Krone, and Resnekov (1971) noted that left ventricular stroke index decreased in smokers at multiple levels of exercise after smoking. Smoking increases oxygen demand but decreases myocardial oxygen supply (Nicolozakes, Binkley, & Leier, 1988). Aronow, Cassidy, and Vangrow (1974) investigated smoking effects and breathing carbon monoxide. They reported that an increased level of carboxyhemoglobin reduced cardiac contractility and increased left ventricular end diastolic pressure. In a study about the effects of smoking in patients with known ischemic heart disease and angina, Nicolozakes, Binkley, and Leier (1988) reported no change in cardiac output after smoking but noted significant changes in heart rate and blood pressure after smoking.

HTN

Hypertension is defined by the Sixth Joint National Committee on Detection, Evaluation, and Treatment of Hypertension (JNC VI) (1997) as a systolic blood pressure (SBP) of 140 mmHg or higher, or a diastolic blood pressure (DBP) of 90 mmhg or higher, or both. The term isolated systolic HTN is used when only the SBP is elevated. Isolated systolic HTN is more commonly seen in the elderly, while combined elevations of systolic and diastolic HTN are more commonly found in middle aged individuals (Aronow, 1997).

Recent reports found that more than half of the population 60 and over have HTN. One of the most recent and significant epidemiological studies of HTN was conducted by the Third National Health and Nutrition Examination Survey (NHANES III) (Burt et al., 1995). The purpose of this survey was to estimate the prevalence, distribution, awareness, treatment, and control of HTN in the adult population in the United States. For this survey of 9901 participants, blood pressures were recorded on two separate occasions, once in the home setting and again in the clinic. This study reported that 24% of the adult population had HTN. Adjusting for age, the investigators reported HTN in non-Hispanic black, non-Hispanic white, and Mexican American populations was reported as, respectively, 32.4%, 23.3% and 22.6%. Although the report noted that awareness, treatment, and control of the disease improved significantly when compared to the 1976-1980 survey, significant variances of treatment existed among these three groups. Twenty-five percent of the non-Hispanic black population achieved blood pressure control, 24% of the non-Hispanic white achieved blood pressure control, and only 14% of the Mexican American group achieved blood pressure control (Burt et al., 1995).

Several longitudinal studies identified that blood pressure (BP) increased with aging (Kannel & Gordon, 1978; Ho et al., 1993). The Framingham study reported that BP increased with age, especially SBP. An age-related increase of approximately 10 mmHg occurred earlier and was faster in women than men. Age-related changes were also reported in the study by Landahl, Bengtsson, Sigurdsson, Svanborg, and Svärdsudd (1986). This summary report of three longitudinal studies of men and women (ages 38 to 79) living in Gotenborg, also found that an increase in SBP was more pronounced in women than men after age 60. An increase in the SBP with aging has been attributed to gradual deterioration of elastic filaments in the large arteries, including the aorta, increasing the afterload. The reason for a more pronounced change in the SBP in women as compared to men remains unexplained.

The prevalence of HTN in the elderly was also documented in the NHANES III study. Individuals aged 65 to 74, were studied for HTN, and 72% African Americans, 53% Caucasians, and 55% Mexican Americans were found to be hypertensive. Of the hypertensive subjects, 49.6% in stage 1, 18.2% in stage 2, and 6.5% for stage 3.

A principal risk factor for CHF, stroke, and coronary events is HTN. The Cardiovascular Health Study, a 5-year study of 5,202 older men and women, found that individuals with a brachial systolic pressure greater than 169 mmHg had an increased mortality rate 2.4 times normal.

Hypertension is classified according to severity into one of three stages. Stage 1 is assigned if the individual has a SBP between 140-159 mmHg, or DBP 90-99 mmHg, or both. Stage 2 is assigned if the SBP is 160-179, or the DBP is 100-109, or both. Stage 3 is assigned if the SBP is 180 or greater, or the DBP is 110 mmHg or greater, or both. Initial treatment of all stages of HTN includes focusing on lifestyle modifications, including weight loss, limiting alcohol consumption, increasing exercise, decreasing sodium intake, and cessation of smoking in an attempt to lower blood pressure. Medications also are prescribed in hypertension that falls into stage 2 or 3 or if the individual in stage 1 has accompanying target organ damage, vascular disease, or diabetes. Guidelines established through research are provided by the JNC VI (1997) and assist providers with prescribing appropriate medications to achieve control of HTN. However, many with HTN remain poorly controlled.

Untreated or inadequately controlled HTN leads to target organ damage including LVH, CHF, angina, stroke, nephropathy, and retinopathy. With elevated BP, systemic vascular resistance increases, resulting in an increase in left ventricular stiffness and reduced ventricular compliance. Subsequently, left ventricular relaxation is impaired, and diastolic filling is impaired. Vascular impedance results in compensatory left ventricular hypertrophy (LVH) to overcome the increased resistance to left ventricular ejection.

Individuals may have HTN for a number of years and remain asymptomatic and untreated. Once detected, aggressive treatment, including education and patient compliance, are important components to successful management of the disease. Patient noncompliance with medication and treatment regimen is frequently speculated as the cause for elevated BP in many studies. One-third of the individuals with HTN in U.S. have not been diagnosed as having HTN, and one-half of the population with a diagnosis of HTN have not received treatment (JNC VI, 1997). Only one-fourth of those with HTN were found to have controlled HTN within the recommended guidelines of less than 140/90. Berlowitz and associates (1998) suggest providers are not aggressively treating HTN. In a study reported by Berlowitz et al. (1998), the care of 800 veterans at multiple sites was examined. The investigators reported 40% of the patients had a blood pressure equal to or greater than 160/90 despite an average of more than six HTN visits per year. The study also pointed out that these patients had access to care and that medications were readily available at no cost or a small copayment.

The Framingham Heart Study underscored the importance of HTN as a risk factor of CHF (Ho, Pinsky, Kannel, & Levy, 1993). This study reported systolic BP as a primary risk factor for cardiovascular disease. In this study, younger men with HTN were associated with a 4-fold increase in the incidence of CHF. Also, seventy percent of the men with CHF had a prior history of HTN.

Numerous studies have documented the benefits of controlling HTN in the elderly. The European Working Party on High Blood Pressure in the Elderly (Prisant & Carr, 1990) was a multicentered, placebo-controlled trial designed to assess the consequences of drug therapy in participants 60 years and older. In this study, 840 participants were randomized and followed over a 4-year period. In those participants randomized to treatment, there was a 19/8 mmhg reduction in BP, with 25% reduction in mortality from all causes, 27% reduction in cardiovascular deaths, and 38% reduction in CHF when compared to those participants in the placebo arm of the trial (Prisant & Carr, 1990).

Ejection Fraction

Frequently, the diagnosis of CHF is made on subjective data, particularly the complaint of dyspnea on minimal exertion. Cowie and associates (1997) suggest that obesity, unrecognized myocardial ischemia, and chronic obstructive pulmonary disease (COPD) often lead to a false-positive diagnosis of CHF. These researchers further suggest that incorrectly labeling patients with CHF is common.

Ejection fraction is the ratio of the stroke volume ejected from the left ventricle per beat to the volume of blood in the left ventricle at the end of diastole. Ejection fraction is expressed as a percent, and the normal ranges between 50% and 70%. Low EF (40% or less) may result after a myocardial infarction, as a result of HTN, valvular disease, or dilated cardiomyopathy. Effective management of CHF is dependent on the correct diagnosis to initiate therapy. Ejection fraction is needed to correctly identify the patient with CHF.

Initial presentation of the patient with CHF is frequently made to an acute care facility where EF can easily be determined with the use of echocardiography. It is strongly suggested that providers obtain EF in patients who are treated on an outpatient basis. Management of CHF should not only aim for the relief of symptoms but also for the reduction of morbidity and mortality. A determination of the EF is necessary to initiate appropriate treatment.

Congestive heart failure may be the result of left ventricular systolic dysfunction, left ventricular diastolic dysfunction, or a combination of both of these conditions. Decreased myocardial contractility may cause CHF associated with an abnormal EF. It is recommended that the provider measure the left ventricular ejection fraction (LVEF) in all individuals suspected to have CHF, preferably by echocardiography to determine the appropriate therapy (Aronow, 1997).

CHF and Readmission

Individuals with CHF experience frequent relapse of the disease and subsequent unplanned hospital readmission. Congestive heart failure is associated with morbidity as well as mortality and exerts a significant cost to the individual, family, and healthcare system. Many researchers have investigated the etiology of the syndrome, but there is limited data on the precipitating factors of CHF.

Relapse may be the result of worsening ventricular function, poor compliance, discharge instruction, and failure of support systems. There exits the possibility that relapse is also a result of other precipitating factors.

Identification of such factors are important to improve the morbidity and mortality of individuals with CHF and to reduce relapse and subsequent hospital admissions (Ghali, Kadakia, Cooper, & Ferlinz 1988; Feenstra, Grobbee, Jonkman, Hoes, & Striker 1998).

In older patients, the readmission diagnosis is frequently the same as the original diagnosis and suggests that relapse and readmission are more common in the elderly population (Rich et al., 1995). Relapse and readmission are frequent phenomena in patients with CHF. Researchers Jaarsma, Halfens, & Saad (1996) suggest many explanations for this occurrence: worsening of the cardiac condition; failure of the health care system to properly plan for discharge and follow-up; readiness for discharge; inadequate family and social support systems; noncompliance with medication and diet regimens; and lack of knowledge to achieve symptom management.

Congestive heart failure is the most common diagnosis for hospitalization of elderly adults over the age of 65, and the rate of hospitalization to treat this condition has increased progressively over the past two decades (National Center for Health Statistics, 1989 Summary; Rich, 1995; AHA, 1996). CHF also predisposes the elderly to increased risk of early rehospitalization. Rates of readmission range from 29% to 47% within 3 to 6 months of the initial discharge (Gooding & Jette 1985; Rich & Freedland, 1988).

Patients with heart failure have the highest hospital readmission rates as compared to all other diagnostic related groups. Much data suggest that these individuals experience a readmission within weeks after discharge. The period of hospitalization usually lasts between 7 and 10 days at a cost of 10,000 dollars or more (Packer, & Cohn, 1999). Many researchers have suggested that a number of the admissions are preventable, but few studies have born out this hypothesis. Many attribute readmission to poor compliance with medication regimens, poor family and social support, inadequate discharge planning, and/or minimal, if any, medical follow-up (Feenstra et al, 1998). However, a study examining compliance of the elderly with CHF reported the oldest elderly patients, those aged 85 years and older, were the most compliant group, possibly because these individuals were more likely to have caregiver assistance with medications and dietary regimens (Monane, Bohn, Gurwitz, Glynn, & Avorn, 1994).

Perhaps the most alarming data suggest the number of cases of CHF is expected to double in the next half century as a result of our aging population (Rich, 1997). In summary, CHF is a common and expensive clinical problem in older adults and exacts a significant burden, both financial and emotional. Congestive heart failure also significantly diminishes the quality of life in the elderly who suffer from this syndrome. As the population of the U.S. continues to age in the coming decades, this problem will continue to stress our already burdened healthcare system.

Summary

Congestive heart failure is a significant health problem for the United States and other industrialized countries as well. Nearly 5 million Americans have CHF, and more than 400,000 new cases are diagnosed annually. Earlier recognition of individuals with heart disease and better treatment contributed to longer survival but increased the likelihood of CHF. The number of hospitalizations for CHF progressively increased during the past two decades, and this rate is expected to continue into the next century with America's aging population.

Readmission is a frequent occurrence in individuals with CHF. Multiple hospital readmissions average between 21% to 27% in this country annually (Shipton, 1996; Clark, 1990). Little is known about what contributes to readmission or how this number can be reduced. The purpose of this study was to determine specific factors predictive of readmission, within 60 days, in elderly patients with CHF. In doing so, the researcher gained a better understanding of how the studied variables impact on readmission in the elderly with CHF.

CHAPTER 3
METHODOLOGY

Chapter 3 is comprised of research design, source of the data, sample, operationalization of the variables, and treatment of the data.

Research Design

A cross-sectional, retrospective design was used for this research. Secondary data were examined to access a sample of primarily elderly male veterans with a diagnosis of CHF who were admitted to a hospital in the Department of Veterans Affairs in the southeastern U.S. Readmission to the facility within 60 days of discharge was examined.

Source of the Data

Permission to conduct the study was obtained from the University of Florida Health Sciences Center Institutional Review Board and the Veterans Administration hospital where the data were obtained.

The data for this study were originally collected using the diagnosis of CHF (ICD-9 code 428.0). The data were collected over a 2-year period beginning in 1996 and were originally collected to establish the Tele-Heart Project to improve the management of CHF patients at a southeastern Veterans Administration Medical Center. The data set included 682 patients with the diagnosis of CHF who were admitted and discharged with the diagnosis of CHF within the period of study. The focus of the original study was to describe the population of patients with CHF and to identify those patients who were readmitted with CHF during the period of study. The sociodemographic variables of age, gender, race, date of admission, marital status, employment status, and date of birth were included in the original data. For this investigation, a comprehensive computer and chart review occurred for the purpose of obtaining additional data. The following additional data were added by the researcher: height, weight, ejection fraction, systolic and diastolic blood pressure, temperature, pulse, respirations, history of smoking in pack years, and current status of smoking in an effort to identify further factors predictive of readmission. The number of patients eliminated due to missing data were 368. The final sample size that was used for the study consisted of 314 patient medical records.

Operationalization of Variables

Gender was a dichotomous variable coded as zero when the patient was female and one when the patient was male. Marital status was a categorical variable coded as one when the patient was single, two when the patient was married, three when the patient was widowed, and four when the patient was divorced. Age of the patient was a continuous variable ranging from 42 to 92 years of age. History of smoking in pack years was a continuous variable ranging from 0 to 200 pack years. Current smoking status was a nominal variable and coded as zero if not currently smoking, and one if currently smoking.

Employment status was a categorical variable coded as one when the patient was employed, two when the patient was unemployed, and three when the patient was retired. Ejection fraction was a continuous variable ranging from 10 to 75 %. The body mass index (BMI) was a continuous variable ranging from 15 to 46. Diastolic blood pressure was a continuous variable ranging from 36 mmHg to 140 mmHg. Systolic blood pressure was a continuous variable ranging from 72 mmHg to 208 mmHg. Pulse was a continuous variable ranging from 46 to 155 beats per minute. Temperature was a continuous variable ranging from 94 to 102 degrees Fahrenheit. Readmission was a discrete variable ranging from 0 to 4 readmissions within the 60-day period.

Treatment of the Data

Descriptive statistics were used to describe demographic characteristics of the sample. The data were analyzed at both the bivariate and multivariate levels. Analysis of variance, t-test and analysis of frequency were performed to determine the difference in subjects with no readmission and those with one or more readmissions with respect to the independent variables. Correlation analysis, step-wise multiple regression and logistic regression were used to address the research hypotheses. Multiple regression analysis was performed on the total sample with the number of readmissions as the dependent variable and age, ejection fraction, temperature, pulse, respirations, BMI, history of smoking in pack years, current smoking status, systolic blood pressure, diastolic blood pressure, marital status, and employment status were the independent variables. Step-wise multiple regression was also used to select the best model in order to identify the predictors of readmission. Logistic regression was used to differentiate between patients with no readmissions and patients with one or more readmissions within sixty days of discharge.

CHAPTER 4
FINDINGS

The purpose of the study was to determine factors predictive of readmission in elderly patients with CHF. From this purpose, three research hypotheses were developed and empirically tested at a 0.05 level of significance. In this chapter, a description of the patients is presented, which includes demographic data and related information. This chapter also includes results of the statistical analysis, which are reported as they relate to the characteristics of the patients and the hypotheses tested.

Characteristics of the Sample

In the present study of 314 patients originally admitted with CHF, 51.3% (n=161) of the patients experienced one or more readmissions within 60 days as compared with 48.7% (n=153) who did not experience a readmission within the 60-day period of study. The range for readmission was from 0 to 4. Patients in this study, who were veterans, were predominately male; 98.4% (n = 309) were males and 1.6% (n = 5) were females. Caucasian males made up 86.6% (n = 272) of the sample compared to 12.1% (n = 38) African American, 1.3% (n = 4) who were Hispanic, and 0.3% (n = 1) who was identified as Mexican. The majority of the study sample were married. In the sample, 61.1% (n = 192) of the patients were married, 21.7% (n = 68) were divorced, 15% (n = 47) were widowed, and 2.2% (n = 7) were single. The mean age of the sample patients was 70.64 years (SD = 9.06), with a range from 42 to 92 years. In the sample, 75.5% (n = 237) of the veterans were retired as compared to 3.8% (n = 12) who were employed and 20.7% (n = 65) who were unemployed. The majority of the study patients had a history of smoking. In the sample, 86.3% (n = 272) had a history of smoking as compared to 13.4% (n = 42) who never smoked. Current smoking status revealed that 28.1% (n = 87) were currently smoking as compared with 70.6% (n = 219) who were not smoking. The mean pack years of smoking was found to be 51.9 pack years and ranged from 0 to 200. The mean ejection fraction was 40.5% with a range of 10 to 75 percent (SD = 15). The mean SBP was 138 mmHg with a range of 72 to 208 mmHg (SD = 27). The mean DBP was 71 mmHg with a range of 36 to 140 mmHg (SD = 14). The mean temperature was 97.5 with a range of 94 to 102 degrees Fahrenheit (SD = 1.3). The mean pulse was 83 beats per minute with a range of 46 to 155 (SD = 19). The mean respiratory rate was 20 respirations per minute with a range of 10 to 40 per minute (SD = 3). The mean BMI was 28 with a range of 15 to 46 (SD = 5.8) (See Tables 4.1, 4.2 and 4.3).

Comparing two groups of no readmissions and one or more readmissions, the results indicated there was no significant difference in mean age (t = 0.161, p = 0.8722), mean ejection fraction (t = 0.603, p = 0.5771), mean temperature (t = 0.182, p = 0.8560), mean pulse (t = 1.396, p = 0.1638), mean respiration (t = 0.761, p = 0.4471), mean body mass index (t = 1.1568, p = 0.8755), mean systolic blood pressure (t = 1.246, p = 0.2136) and number of packs years of cigarette smoking (t = 0.419, p = 0.6754) between those with no readmission and those with one or more readmissions. Only the mean diastolic blood pressure was significantly different between the two groups (t = 2.243, p = 0.0256).

Also, the results indicated that out of 153 subjects with no readmission, 150 (98.04%) were male and 3 (1.96%) were female and out of 161 subjects with one or more readmissions, 159 (98.76%) were male and 2 (1.24%) were female. There was no significant relationship between number of readmissions and gender (chi-square = 0.258, p = 0.611). Based on the variable race, out of 153 subjects with no readmission, 131 (85.62%) were white, 20 (13.07%) were black, and 2 (1.31%) were Hispanic, while out of 161 subjects with one or more readmissions, 141 (87.58%) were white, 18 (11.18%) were black, and 2 (1.24%) were Hispanic. There was no significant relationship between number of readmissions and race (chi-square = 0.269, p = 0.874). On the other hand, out of 153 subjects with no readmission, 7 (4.58%) were single, 89 (58.17%) were married, 25 (16.34%) were widowed, and 32 (20.92%) were divorced; out of 161 subjects with one or more readmissions, 0 (0.00%) were single, 103 (63.98%) were married, 22 (13.66%) were widowed, and 36 (22.36%) were divorced. There was a significant relationship between number of readmissions and marital status (p = 0.033, using Fisher Exact).

With regard to employment status, out of 153 subjects with no readmission, 6 (3.92%) were employed, 115 (75.16%) were retired, and 32 (20.92%) were unemployed, while out of 161 subjects with one or more readmissions, 6 (3.73%) were employed, 122 (75.78%) were retired, and 33 (20.50%) were unemployed. There was no significant relationship between number of readmissions and employment status (chi-square = 0.018, p = 0.991). With respect to smoking, out of 153 subjects with no readmission, 129 (84.31%) smoked and 24 (15.69%) did not smoke and out of 161 subjects with one or more readmissions, 143 (88.82%) smoked and 18 (11.18%) did not smoke. The results showed that there was no statistically significant relationship between number of readmissions and current smoking status (chi-square = 1.375, p = 0.241).

Dividing the patients with one or more readmissions into those with one readmission, with two readmissions, and with three or more readmissions, the results indicated that out of 314 subjects in the sample 153 (48.73%) had no readmission, 92 (29.30%) had one readmission, 51 (16.24%) had two readmissions, and 18 (5.73%) had three or more readmissions. Of 92 subjects with one readmission, 0 (0.00%) were single, 61 (66.30%) were married, 12 (13.04%) were widowed, and 19 (20.65%) were divorced. Among the 51 subjects with 2 readmissions, 0 (0.00%) were single, 30 (58.82%) were married, 8 (15.69%) were widowed, and 13 (25.49%) were divorced. Of those subjects with three or more readmissions, 0 (0.00%) were single, 12 (66.67%) were married, 2 (11.11%) were widowed, and 4 (22.22%) were divorced. There was no significant relationship between number of readmissions and marital status (p = 0.307, using Fisher Exact). Unlike the previous situation, when the readmissions were divided into one, two, or three or more times, the significance results with respect to martial status was not supported.

Similarly, there were no significant relationships between the readmission times of 0, 1, 2, 3 or more, and employment status, race, and smoking. Also, there were no significant differences in means age, systolic blood pressure, ejection fraction, body mass index, temperature, pulse, respiration, and number of pack years smoked among the four groups of subjects with 0, 1, 2, and 3 or more readmission times. However, as before, the mean diastolic blood pressure was significantly different among the four groups (F = 2.96, p = 0.0324). The mean diastolic blood pressure of those subjects with 3 or more readmissions was the highest (73.50 mmHg).

Analyses of Data in Relation to the Hypotheses

Hypothesis 1

The first hypothesis stated that readmission in patients with CHF was significantly correlated with history of smoking and current smoking status. The hypothesis was partially supported. The correlation analysis between readmission and history of smoking indicated a significant relationship between number of readmissions and history of smoking in pack years (r = 0.14, p = 0.0154). However analysis of frequency indicated that there was no statistically significant relationship between number of readmissions and current smoking status (chi-square = 1.375, p=0.241).

Hypothesis 2

The second hypothesis stated that readmission in patients diagnosed with CHF was significantly correlated with ejection fraction. The results did not support this hypothesis. The correlation between readmission and ejection fraction was statistically nonsignificant (r = 0.01, p = 0.8028). Also the difference in mean ejection fraction with the patients with no readmission and with one or more readmission was statistically nonsignificant (t = 0.603, p = 0.5771). In addition, the difference in mean ejection fraction with the patients with no readmission and those with one, two, three or more readmissions was not statistically significant (F = 0.72, P = 0.5408).

Hypothesis 3

The third hypothesis stated that readmission in patients with CHF was significantly affected by demographic variables including age, height and weight (BMI), blood pressure, marital status, employment, and smoking history (pack years) and current smoking status. Step-wise multiple regression was used by regressing the number of readmissions on age, ejection fraction, body temperature, pulse, respiration, body mass index, smoking status, history of smoking, systolic blood pressure, diastolic blood pressure, marital status, and employment status. Using ANOVA, the final step indicated that only variables, history of smoking in pack years, diastolic blood pressure, and marital status (single) were significant in predicting the number of readmissions (F = 4.46, P = 0.0044). However, there was an inverse relationship between DBP and the number of readmissions. Those patients with lower mean DBP had greater numbers of readmissions. Also, the patients who characterized themselves as single had no readmissions as compared to those who characterized themselves as widowed, married, or divorced (See Table 4.4)..

Also, logistic regression was used to differentiate between those who were not readmitted and those with one or more readmissions with respect to the independent variables. The results indicated that only two variables, history of smoking and diastolic blood pressure, were significantly different between the two groups (chi-square = 9.623, p = 0.0081).

Table 4.1

Summary Measures of Independent Variables Age, EF, Temperature, Pulse, Respirations, Height, Weight, Pack Years of Smoking, SBP, DBP, BMI (n=314).

Variable	Mean	SD	Min	Max
Age	70.64	9.06	42	92
EF	40.55	15.00	10	75
Temperature	97.58	1.14	94	102
Pulse	83.01	19.85	46	155
Respirations	20.61	3.79	10	40
Height	69.12	2.84	58	78
Weight	193.27	41.37	111	335
Pack Years of Smoking	51.91	38.32	0	200
SBP	138.89	17.48	72	208
DBP	71.57	14.82	36	140
BMI	28.21	5.82	15.79	46.35

Table 4.2
Frequency and Percent of Variables Readmission, Gender, Race, Marital Status, Employment Status, Smoking in Pack Years, Current Smoking Status (n=314).

Variable	Frequency	Percent
Readmission		
0	153	48.7
1	92	29.3
2	51	16.2
3	16	5.1
4	2	0.6
Sex		
F	5	1.6
M	309	98.4
Race		
African American	37	11.8
Hispanic	4	1.3
Mexican	1	0.3
Caucasian	272	86.6
Marital Status		
Single	7	2.2
Married	192	61.1
Widowed	47	15.0
Divorced	68	21.7
Employment Status		
Employed	12	3.8
Retired	237	75.5
Unemployed	65	20.7
Smoking History		
Never Smoked	42	13.4
Positive History of Smoking	272	86.6
Current Smoking Status		
Yes (currently smoking)	87	28.1
No (Not currently smoking)	219	70.6

Table 4.3

Mean and Standard Deviaion of Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) for Subjects with 0, 1, 2, and 3 or More Readmissions

		SBP		DBP	
Number of Readmission	N	Mean	Standard Deviation	Mean	Standard Deviation
0	153	140.87	28.22	73.48	14.91
1	91	138.29	26.49	70.73	15.47
2	51	131.04	24.87	66.67	13.28
3	18	147.39	30.10	73.50	11.97

Table 4.4

The Final Results of Stepwise Multiple Regression

Variable	Parameter Estimate	Standard Error	F-value	P-value
Intercept	1.17304	0.26171	20.09	0.0001
HSMK	0.00301	0.00133	5.12	0.0243
DBP	-0.00732	0.00345	4.49	0.0348
MS (Single)	-0.81057	0.37024	4.79	0.0293

CHAPTER 5
DISCUSSION AND RECOMMENDATIONS

This chapter presents conclusions and a discussion of the findings derived from these data, recommendations for future research, and implications for nursing practice. The purpose of this study was to determine factors predictive of readmission, within 60 days, in elderly patients with CHF. For this study, readmission was defined as an unscheduled admission for an acute problem associated with the patient's principal chronic disease of CHF within 60 days of discharge from an acute healthcare facility. A cross-sectional, retrospective design using secondary data and medical records was used to access a sample of primarily elderly veterans with the diagnosis of CHF. The researcher examined the variables of age, gender, race, marital status, employment status, BMI, systolic blood pressure, diastolic blood pressure, ejection fraction, vital signs, history of smoking in pack years, and current smoking status in an effort to identify factors predictive of readmission. The researcher eliminated 368 patient records from the data set due to missing data. The final data set used for analysis contained 314 patient medical records.

It was hypothesized that readmission in patients with CHF is significantly correlated with history of smoking in pack years and current smoking status. It was also hypothesized that readmission is significantly correlated with ejection fraction. The researcher also hypothesized that readmission in patients with CHF is significantly affected by sociodemographic variables of age, height and weight, body mass index (BMI), temperature, pulse, respirations, systolic blood pressure, diastolic blood pressure, marital status, and employment status.

The most important factors predictive of readmission were history of smoking, diastolic blood pressure, and marital status. Logistic regression analysis was used to differentiate between those patients who were readmitted within 60 days and those who were not readmitted. The results indicated that only two variables, history of smoking and diastolic blood pressure, were significantly different between the two groups.

Discussion

In this study of early readmission in the elderly with CHF, using step-wise multiple regression analysis, independent variables history of smoking in pack years, diastolic blood pressure and marital status were significant in predicting the number of readmissions in elderly patients with CHF, within sixty days following discharge.

The findings of smoking in pack years contributing to early readmission is consistent with other research findings. Cigarette smoking is a major independent risk factor for cardiovascular disease. Rosenman (1989) reported significant blood pressure changes occurred with cigarette smoking. The study reported that smoking increased diastolic blood pressure, induced arterial vasoconstriction, and stimulated the release of epinephrine and norepinephrine. Rabinowitz et al. (1979) compared hemodynamic effects before and after smoking in smokers and nonsmokers and reported smokers and nonsmokers behaved alike with significant increases in heart rate, SBP and DBP and after smoking. These studies were consistent with earlier research on smoking and hemodynamic effects at rest and during exercise in normal subjects. Goldbarg et al. (1971) reported smoking increased heart rate markedly both at rest and in multilevel of exercise. The study also reported decreased efficiency of the heart, causing a reduction in stroke volume during exercise and higher heart rate during exercise.

These findings also support a recent, large cohort study of risk factors and heart disease. A large prospective study of risk factors for new coronary events reported that cigarette smoking increased the risk of having a new coronary event 2.2 times greater in older men who were current cigarette smokers after controlling for confounding effects of other variables (Aronow & Ahn, 1996). However, this study did not support the findings of the Framingham Heart Study (Ho et al. 1993), which reported cigarette smoking increased the likelihood of heart failure in younger men but not older men.

Diastolic blood pressure was also predictive of readmission in this study. However, there was an inverse relationship between DBP and the number of readmissions; those patients with a lower mean DBP had a greater number of readmissions. It is important to note DBP in the data set ranged from 36 to 140 mmHg. The lower DBP may reflect patients in the data set who were in severe or terminal stages of CHF. It is also important to note that the mean DBP is lowest in those with two readmissions and highest in those with three or more readmissions. Improvements in the recognition and control of hypertension, such as the NHANES III (Burt et al. 1995), have helped to identify those at risk for HTN and the role of HTN as a risk factor for HD and CHF. The Framingham Heart Study provided significant epidemiologic data of the prevalence of HTN especially among the elderly (Poole-Wilson, 1997). The findings of this study are consistent with the Hypertension Optimum Treatment trial (HOT), which indicated the drug combination therapy to achieve DBP control at a level less than 80 mmHg provided the best quality of life (Hansson, Zanchetti, & Carruthers, 1998).

However, the findings of the study of readmission do not support other studies that focus on controlling SBP. Systolic blood pressure did not prove to be statistically significant in the readmission of elderly males with CHF. The large standard deviation in the SBP of the data set limits the ability to obtain significance.

In this study of readmission, marital status was the third variable predictive of readmission in the elderly with CHF. There were seven male patients in the data set and none were readmitted within the 60 day period of study. It is not known if these males were readmitted elsewhere. This finding is inconsistent with current research findings. Marital status has been extensively studied and consistently reported to be closely associated with emotional and physical well-being. Comparing married males to unmarried males, researchers reported unmarried males have higher age-adjusted mortality rates from all causes of death (Litwack & Messeri, 1989). Older married men are more likely to have a spouse to assist with their care, assist with medication and meal preparation, and participate in their health and well-being.

There are numerous explanations that attempt to describe the positive relationship between social support and health. Other research suggests that marriage benefits partners and improves health as a result of social support. Researchers suggest that marriage protects the partners by improving coping strategies and further suggest that each partner is more likely to engage in healthy behaviors when compared to unmarried.

Significant research has reported the benefit of marriage and resulting social support impacts health (Berkman, Millar, Holmes, & Bonander, 1991). Berkman et. al (1991) reported that unmarried cardiac patients were at greater risk for rehospitalization when compared to married cardiac patients. Berkman et al. (1991) further suggest this difference is attributed to the isolation of living alone and less available support systems. Their study also suggests that social support may be more critical in preventing readmission. Choi (1996) reported that unmarried, elderly males receive less social support, are more isolated, and rely on distant relatives and friends for emotional support more than elderly married males.

Implications for Nursing Research

The findings of this study support the need for nurse practitioners and nurses to implement effective smoking strategies with their patient panels–careful, consistent screening with each visit, offering supportive literature, and follow-up interviews. Also, providers may consider strategies to encourage continued attempts at cessation. Careful documentation of smoking status and pack years of smoking is encouraged on each office visit and hospitalization. Exsmokers are very vulnerable to relapse and continued cessation of reinforcement should be encouraged.

The findings of this study support aggressive control of hypertension. Urgent need for detection and control of hypertension is undeniable. Despite greater awareness of hypertension in the United States, control continues to elude the patient and provider. Patient compliance and adherence to medications and dietary guidelines are often cited as the causes of failed control. However, the JNC VI (1997) suggests providers are not changing blood pressure medications or adding additional agents to achieve control. The report prepared by the JNC VI reveals that 17 million people in the U.S. have undiagnosed hypertension, and 50% of those with diagnosed hypertension are not taking medication for this condition. The JNC VI also reported only 25% of the individuals with hypertension are being controlled within the recommended guidelines of less than 140/90 mmHg. Providers are encouraged to address the issue of control and to include this in each visit, to encourage patients to self-monitor and document blood pressure recordings in the home setting and return with documentation may be an avenue to achieve better control, and to encourage attendance of local classes on hypertension and providing informational materials are suggested for greater involvement and achieving control.

In this study, factors predictive of readmission, within 60 days, in elderly patients with CHF were researched using analysis of secondary data. There were significant benefits to using a secondary data in this research. The secondary data set contained a large sample and this can be most beneficial when little is known about the area of interest. The following are specific recommendations for future nursing research based on the findings of this study.

It would be beneficial to examine readmission using a prospective design and including a larger numbers of females and single males. These recommendations are made based on the small number of females (5) and single males (7) who were in this data set sample. Also, a secondary analysis of existing data could be researched using multicenters and compare those findings to the findings of this study. Finally, nurse researchers and nurse practitioners are encouraged to examine the longterm benefits of smoking cessation and hypertension control projects and to evaluate the benefits of these programs on CHF and readmission. Nurse practitioners offer a unique perspective to patients with chronic illness and can be instrumental in the patient understanding the disease process while establishing and maintaining control of the disease.

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BIOGRAPHICAL SKETCH

Judy Perry Burford received her Bachelor of Science in Nursing from Old Dominion University in 1972 and her Master of Science in Nursing from the University of Kentucky in 1974. She has an extensive clinical and administrative career in nursing. She taught nursing at both the associate and baccalaureate level. She served as an instructor at Broward Community College in Ft. Lauderdale, Florida, and later served as department chairman of nursing for eight years before moving to Gainesville, Florida. She was an assistant professor in the College of Nursing at the University of Florida prior to pursuing her doctoral studies. She is currently a nurse practitioner at the Gainesville Veterans Affairs Medical Center. It was in this position she began to pursue her interests in congestive heart failure and plans to continue her research in this area.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Carol Ann Reed Ash

Carol Ann Reed Ash, Chair
Eminent Scholar of Nursing

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Sandra F. Seymour

Sandra F. Seymour
Associate Professor of Nursing

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Claydell Horne

Claydell H. Horne
Associate Professor of Nursing

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Hossein N. Yarandi
Associate Professor of Nursing

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Felix M. Berardo
Professor of Sociology

This dissertation was submitted to the Graduate Faculty of the College of Nursing and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December 2000

Kathleen Ann Long
Dean, College of Nursing

Dean, Graduate School